Appendix F
Sites in Progress Pending Records of Decision Requiring Remedial or Removal Action

List of Sites

Priority 2 and 3 Study Area Sites. Note details of the remedial objectives, recommendations and Statements of Continued Protection of Human Health are contained in F.1. The remaining Priority 2 and 3 sites will reference back to this appendix.

APPENDIX F.1

Site Name: Chemical Spill-5 Former Refueler Maintenance Shop

Site Description

Study Area CS-5 is located at Building 3461 at the northeastern corner of Beaman and Weaver roads (Figure 6). From 1941 until 1946, Building 3461 was used by the U.S. Army as a weapons repair shop. Most of the study area is nearly level, with the majority of it covered by asphalt. A moderate slope was observed on the southwestern side of the study area, between the fence line and Weaver Road. Fences surround the area south of the building. Stained soil was observed south of the inner fence line during the field investigation.

Study Area CS-5 was evaluated as part of the MMR records search (E.C. Jordan Co., 1986a). According to the records search, a rust-inhibiting petroleum product called Cosmoline was routinely removed from new weapons, reportedly using gasoline and/or kerosene. Cosmoline and the compounds used to remove it were potentially disposed of at Study Area CS-5 (E.C. Jordan Co., 1986a). Based on results of the records search, the area was recommended for an SI.

The PA stated that from 1955 until 1967, the USAF used the area as a refueler maintenance shop and a spray paint shop. In addition to Cosmoline, waste oil, solvents, paints, battery acid, and antifreeze may have been disposed of on-site (E.C. Jordan Co., 1986a). During this time, 5,000-gallon refueler trucks were routinely emptied of up to 1,000 gallons of fuel, which was potentially disposed of on the ground at the study area. In addition, undocumented quantities of aviation gasoline (AVGAS) and jet fuel No. 4 (JP-4) were reportedly disposed of on the ground when filters were changed on the refueling trucks. The study area is believed to have been used as a salvage yard sometime during the period of operation. During the 1993 field investigation, Building 3461 was being used to store office furniture.

Two underground structures existed at the study area: an oil interceptor and a sump. A paint hood formerly located inside Building 3461 drained to an oil interceptor located outside the northwestern side of the building. The sump was located inside the building on the northern side and appears to discharge to a subsurface location outside the northern wall of the building. During the 1991 field investigation, two phases of liquid, an aqueous phase and an oil phase, were observed and sampled from the sump. No measurable liquid was observed in the oil interceptor. In 1996, as part of the DSRP, the oil interceptor and surrounding soil were removed, and the sump was decontaminated in place and filled with concrete. Closure reports documenting the clean closure of the structures are available at the IRP offices at MMR.

To identify potential risks associated with exposure to study-area-related CPCs, sitewide PRE and PRA calculations were conducted for surface and subsurface soil at Study Area CS-5 for both human health and ecological exposure scenarios. A detailed discussion of the PRE and PRA methodologies is in the RAH (ASG, 1994).

The PRA calculations indicate that estimated potential risks for current and future older child trespasser and utility worker exposure to maximum and mean COC concentrations in surface and subsurface soil at Study Area CS-5 do not exceed USEPA (10^{-4} to 10^{-6}) or MADEP (10^{-5}) risk-

management criteria. However, for the future residential scenario, estimated potential cancer risks are within the USEPA target risk range but exceed the MADEP cancer risk target for exposure to mean COC concentrations. Estimated potential noncancer risks associated with maximum COC concentrations slightly exceed the USEPA target HI. The majority of the potential estimated cancer and noncancer risks are attributable to Aroclor-1242, which was found at TP-4. Lead was not quantitatively evaluated; however, maximum and mean lead concentrations detected in soil at TP-15 significantly exceed the USEPA and MADEP lead guidance values.

The PRA calculations indicate potential surface-soil risks in excess of risk-management guidelines provided in the RAH for two ecological receptors, the white-footed mouse and the upland sandpiper. The majority of ecological risks are attributable to lead exposure through the food-chain ingestion pathway. A removal action was recommended for this site in the Priority 2 and 3 Study Area SI report (ABB-ES, 1993).

Discussion of Remedial Objectives

Comparison of contaminant concentrations identified at Study Area CS-5 to HECs showed that surface soil contaminated with Aroclor-1242 and lead may pose unacceptable risk to humans and ecological receptors. Elevated levels of petroleum hydrocarbons also are present in surface soil at this study area.

Removal action objectives were developed based on these considerations and were established to achieve the overall objective of protecting human health and the environment. With this primary objective in mind, the scope of the removal action is to provide for the complete removal of contaminants from the site (i.e., total site cleanup), such that unacceptable risks to human and ecological receptors are eliminated. AFCEE anticipates that these removal actions will be the final actions to remediate these study areas. As such, removal actions that will provide complete and irreversible contaminant removal are considered during alternative development. The alternative evaluations include a discussion of the effectiveness and permanence of the removal actions.

For the whole Priority 2 and 3 Study Area; The developed removal action objectives identity the responses necessary to achieve the scope of the removal actions, provide protection to human health and ecological receptors, and mitigate the potential groundwater impacts posed by contaminated soil.

In general, contaminant concentrations were compared to STCLs to determine the estimated extent of soil affected by site contaminants. Based on the existing analytical data, estimates of the horizontal extent and depth of soil removals were made for each study area. The final extent of removal will be determined based on the results of confirmation sampling and risk management decisions.

Removal action contracting activities will be conducted concurrently with the preparation of the Action Memorandum. The schedule for completion of the removal actions is dependent upon the alternative selected. The Removal Action Schedule is as follows:

EE/CA Public Comment Period	November 13–December 12, 1998
Submittal Draft Action Memorandum	February 15, 1999
Begin Removal Action Contracting	February 15, 1999
Submit Final Action Memorandum	March 17, 1999
Award Removal Action Contract	May 15, 1999

Areas of Noncompliance
There are no areas of noncompliance.

Recommendations
It is recommended that the preferred alternative be implemented as described for the 6 AOC's. Alternative 2 combines excavation, on-base asphalt batching, and/or off-base treatment and disposal of contaminated shallow soil from Study Areas CS-5, CS-11, FS- 18, CS-4 (USCG)/FS-1 (USCG), FS-7, and the DDOU. Additionally, a low-flow SVE system would be constructed at Study Area FS-4 to remove contaminants from deep subsurface soil, if necessary. This alternative includes the following major components:

- predesign activities;
- mobilization and site preparation;
- trench drain removal at Study Area CS-4 (USCG)/FS-1 (USCG);
- soil excavation, transportation, and stockpiling;
- on-base asphalt batching;
- off-base treatment and disposal;
- in-situ treatment at Study Area FS-4;
- site restoration; and
- wetlands restoration and monitoring.

Each component of the alternative is described in the following paragraphs.

The wetlands delineation at Study Area FS-18, predesign investigation at Study Area FS-4, and geophysical survey at the DDOU would be performed.

It is assumed that the on-site asphalt-batching facility would be located at FTA-1 on Kittredge Road, the former location of an on-base thermal desorption treatment unit. Locating the treatment facility here would minimize setup and permitting costs because the site is centrally located between the study areas, has an existing paved surface, available utility services, and controlled entry.

The trench drain associated with Hangar 128 would be investigated and removed, if necessary.

Excavation and confirmation sampling would be conducted. Because asphalt batching provides effective treatment of both organic and inorganic contaminants, there would be no need to stockpile soil from Study Areas CS-11, FS-18, CS-4 (USCG)/FS-1 (USCG), FS-7, and the DDOU separately for this alternative. Stockpile and decontamination areas for this alternative would be constructed in a manner similar to that for Alternative 1. An area would also be built for stockpile of treated material and would consist of a bermed asphalt pad. An estimated 2,500

cy of soil will require stockpiling; therefore, stockpile areas totaling approximately 2,500 square yards would be necessary.

Soil from Study Area CS-5 Areas 1 and 2 would be stockpiled at the study area and analyzed for concentrations of lead and PCBs. If sampling and analysis indicated lead concentrations less than 20 times the TCLP limit and PCB concentrations less than 2 mg/kg, the soil could be recycled through the on-base asphalt-batching system. The PCB limit for asphalt batching was determined with consideration of soil recycling permits issued by the MADEP Division of Hazardous Waste (M&E, 1995). An exceedence of 20 times the TCLP limit for lead would require the soil to receive TCLP analysis. Soil with concentrations less than the TCLP limit (i.e., 5 mg/L) would be processed in the on-base asphalt-batching unit. Soil exceeding the TCLP limit or 2 mg/kg PCBs would be sent off base for treatment and/or disposal in a permitted TSDF.

Asphalt batching is a method of stabilizing contaminants in soil using an ambient-temperature asphalt emulsion. The technology is referred to as soil recycling because the material is turned into an environmentally stable, structurally enhanced paving subgrade material. The technology has been applied to soil contaminated with petroleum hydrocarbons, VOCs, PAHs, PCBs, and metals. The process requires no external heat, thereby minimizing volatilization of contaminants. An asphalt-batching system has successfully operated at MMR for treatment of contaminated soil under the MMR DSRP.

Analytical results from stockpile samples would be used to confirm that excavated soil is acceptable for the asphalt-batching process. Collected samples would be analyzed for COCs listed for RCRA toxicity characteristic (40 CFR 261). For the purposes of cost estimation, one sample per 100 cy of stockpiled, excavated material is assumed; this frequency is typically required by asphalt-batching contractors. Samples with contaminant concentrations greater than 20 times TCLP regulatory levels would receive TCLP analysis. Soil with concentrations that exceed the Massachusetts Permitted Soil Recycling Facility Summary Levels, Massachusetts Method 1 S-1 standards for pesticides or TCLP criteria would not be treated on-base but would be transported to an off-base, permitted TSDF for treatment and/or disposal. Soil with concentrations below the above criteria would be processed in the asphalt-batching facility.

Following characterization sampling, soil meeting asphalt-batching and analytical standards would be screened, as necessary, to remove oversized objects larger than approximately three-quarters of an inch. Oversized material would be crushed to less than three-quarters of an inch and used as aggregate material in the asphalt-batching process to provide a structurally suitable asphalt product. For cost estimation, it is assumed 20 percent of excavated material will be greater than three-quarters of an inch in diameter and require crushing prior to processing.

Excavated soil and crushed material would then be processed. Asphalt-batching involves the addition of an asphalt-emulsion coating to contaminated soil. A front-end loader feeds soil into a hopper, from which it is transported to a mixing chamber via a conveyor belt. The soil passes through a series of counter-rotating blades, where the emulsion is applied. The asphalt-emulsion-coated soil exits the system and is stockpiled for curing for approximately 72 hours. During the curing process, the asphalt-emulsion-coated product binds the contaminants to the soil, which becomes structurally enhanced and can be stockpiled for several months prior to use. Stability of

the material would be verified with appropriate testing methods prior to reuse. The asphalt-emulsion-stabilized material then would be utilized as a paving subgrade material for paving projects at MMR. The recycled material would be covered with a 1-1/2-inch layer of surface-wearing coarse asphalt to prevent surface wear and potential reintroduction of contaminants into the environment via airborne particulates.

Statement of the Continued Protection of Human Health and the Environment

The selected alternative for the priority 2 and 3 Study Areas will meet removal action objectives and provide protection of human health and the environment at the study areas. On-base asphalt batching would bind organic and inorganic contaminants to soil in an asphalt emulsion, thereby permanently reducing the mobility of contaminants. No change in contaminant toxicity is anticipated, and the volume of contaminated soil may increase slightly due to the addition of mixing materials and emulsion during the process. No contamination would be destroyed. Off-base treatment and/or disposal in an approved, secure landfill would reduce contaminant exposure potential and provide a reduction in contaminant mobility. Landfilling is a widely recognized and accepted containment technology.

A low-flow SVE system will reduce concentrations of contaminants in subsurface soil at Study Area FS-4 to below STCLs, thereby providing long-term effectiveness and protection of human health.

APPENDIX F.2

Site Name: Chemical Spill-10 UTES/BOMARC Site Source

Site Description

The Chemical Spill No. 10 and Fuel Spill No. 24 site (CS-10/FS-24) is next to the eastern boundary of Massachusetts Military Reservation (MMR) in the Town of Sandwich, Massachusetts, immediately north of the MMR Sandwich Gate on Greenway Road (Figure 6). Most of the 38-acre site is fenced and consists of a number of buildings originally constructed as part of the Boeing Michigan Aerospace Research Center (BOMARC), a missile launcher and maintenance facility operated by the U. S. Air Force (USAF). The facility is currently used by the Army National Guard (ARNG) as a storage site for training equipment. Three areas of CS-10/FS-24 are located outside the fenced portion of the facility: the waste oil disposal site to the north and two storm sewer drainage facilities to the south and east. The following items summarize the history of CS-10/FS-24.

- Before 1956. CS- 10 was occupied by a rifle range.
- 1958. Construction of the BOMARC missile site began.
- 1960 to 1973. USAF operated the BOMARC site until 1973, when the facility was decommissioned and transferred from USAF to ARNG control. Waste materials related to site operations and maintenance included cleaning solvents and fuel-related compounds associated with missiles, power supply, and heat generation.
- 1978 to present. In 1978, the ARNG began limited use of abandoned buildings for equipment maintenance and storage. The site also is used for vehicle maintenance. Motor oil, hydraulic fluid, battery electrolyte, cleaners, paints, and paint removers have been used on-site during this period.
- 1985. Several underground storage tanks were removed at CS-10 and backfilled with clean sand. FS-24, a fuel spill of less than 500 gallons, occurred during tank removal at Building 4606; contaminated soils were removed and backfilled with clean sand.
- 1985 and 1986. Monitoring wells were installed and groundwater contamination was detected at CS-10.
- 1989. A site investigation (SI) was performed to assess the presence of contamination in soils, sediment, groundwater.
- 1989 and 1990. An interim remedial investigation (RI) was performed to further assess the nature and distribution of contamination in various media.
- 1990 and 1993. Source control actions were taken to eliminate potential sources at CS-10. These included the cleaning of oil interceptors and removal of above- and belowground storage tanks.
- 1992 and 1993. A final RI was performed to further characterize contamination and to evaluate potential site risks. Nine source areas were identified that warrant cleanup actions.
- 1996. Inactive sumps and associated contaminated soils were removed under the MMR Drainage Structure Removal Program (DSRP).
- 1996. A supplemental field investigation was performed to fill data gaps in the evaluation of treatment technologies for source cleanup at the nine locations.
- 1996 and 1997. A focused feasibility study was performed to evaluate alternatives for controlling potential site risks. This study provides the detailed basis for this Proposed Plan.

- 1998. Supplemental sampling for asbestos, radiological surveying, and explosives testing were conducted to ensure the protection of human health and adequacy of the proposed remedial alternative. No explosive constituents were found above the reporting limit in any of the subsurface soil samples.

Groundwater contamination associated with CS-10/FS-24 will be addressed in separate studies under the Plume Response Plan. In addition, the actions proposed in this proposed plan will help minimize groundwater contamination and may reduce future groundwater treatment requirements.

Other source remediation efforts at CS-10/FS-24, which included drainage structure removal, have been addressed separately from this proposed plan under the DSRP. The DSRP involves a systematic, basewide investigation and cleanup effort to address drainage sumps that were used historically at MMR, including those at CS-10/FS-24.

Removal activities conducted under the DSRP are described more completely in the *Drainage Structure Removal Program Remedial Action Workplan* (Jacobs Engineering Group [JEG], 1995). Under the DSRP in 1996, 15 drainage structures and surrounding soils were removed; two drainage structures were cleaned and filled with concrete at CS-10. In addition to the drainage structures, a total of 31,550 gallons of liquids was removed from the structures and treated at an off-base industrial wastewater treatment facility, and 702 cubic yards (cy) of contaminated soils was removed and sent to an on-site asphalt-batching facility. Three additional drainage structures were not removed at CS-10 because of access restrictions. AFCEE plans to perform an investigation and sampling of structures not addressed under the DSRP prior to issuance of the Record of Decision (ROD) and, if necessary, to address potential source area remediation. The DSRP activities are summarized in the *Drainage Structure Removal Program Remedial Action Summary Report* (ABB-ES, 1998) currently under regulatory review.

The selected remedial choice in the *Draft Final Proposed Plan to Clean Up Source Operable Unit at Chemical Spill No. 10 (CS-10) and Fuel Spill 24 (FS-24) Site, August 1998* is currently undergoing regulatory review.

Discussion of Remedial Objectives

Investigations at the nine source areas of CS-10/FS-24 detected a variety of inorganic and organic contaminants in the soils and sediments. These contaminants are associated with the use of fuels, solvents, and other historical site-related activities at CS-10/FS-24. The results of the risk assessment for CS-10/FS-24 vary according to the conditions and site contaminants found at the source areas.

Human health risks from exposure to soil do not exceed federal and state risk management guidelines. However, based on the ecological risk assessment, surface soils at these source areas pose an unacceptable risk from metals (antimony, arsenic, cadmium, chromium, copper, lead, vanadium, and zinc), dieldrin, and/or polynuclear aromatic hydrocarbons (PAHs).

Groundwater beneath and downgradient of CS-10/FS-24 is contaminated with solvent-related

organic compounds. Following an extensive public decision process, a decision was announced in August 1997 on how the CS-10 groundwater plume will be treated. The Sandwich Road Fence treatment system startup is scheduled to begin June 1999.

Actual or threatened releases of hazardous substances from CS-10/FS-24, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

Cleanup goals established for soil at CS- 10/FS-24 are STCLs. These levels are MMR-specific, risk-based and leaching-based concentrations protective of human health and the environment. STCLs were developed during the MMR DSRP. The RI for CS-10/FS-24 identified contaminants that pose unacceptable risk to human and ecological receptors from potential exposure to shallow soils, surface water, and sediment. These contaminants were compared to risk-based STCLs to determine the extent to which an area must be remediated. The concentrations of contaminants found in deeper soils with the potential to leach to groundwater were compared to leaching-based STCLs to identify where cleanup is required to prevent future contaminant migration to groundwater.

Areas of Noncompliance
There are no areas of noncompliance.

Recommendations
Implemented the selected remedy as proposed. AFCEE's preferred alternative for CS-10/FS-24 is Alternative 3, Excavation and On-Site Asphalt Batching/In Situ Thermally Enhanced SVE/Environmental Monitoring. The excavation and on-site asphalt batching addresses the cleanup of shallow soils at seven of the nine source areas; the in situ thermally enhanced soil-vapor extraction (SVE) addresses cleanup of deeper soils at one of the nine source areas; and the environmental monitoring occurs at two of the nine source areas where soil contaminant concentrations are very low and remediation is unwarranted.

A total of approximately 3400 cy of soil and sediment would be removed at seven of the source areas at CS-10/FS-24 (Details A, B, C, D, E, F, and I). The soils and sediment would be stockpiled, covered to eliminate contaminant migration, and processed in a cold-mix asphalt batch plant set up on site. Batched asphalt would be used at MMR and coordinated with similar cleanup efforts at other MMR sites. An underground storage tank (UST) and associated piping at Detail C would be removed during this phase of cleanup. Confirmation sampling would be conducted during the excavation process to ensure the limits of contaminated soil are met. The excavations would then be backfilled with clean material, and wetland areas at Detail F would be restored as appropriate under Massachusetts regulations. Because contaminated soil will be removed from this site and the preferred alternative does not include site access restrictions. Confirmation sampling and laboratory analysis of sediment will be conducted prior to issuance of the ROD.

If soils contamination the Detail C source area require treatment, the preferred alternative for cleanup of these would involve the installation of hot air injection wells, extraction wells, a vapor collection system, and a temporary impermeable cover. A mobile, thermally enhanced

SVE system consisting of an air blower/burner to inject hot air and off-gas treatment system would be set up to remove and treat organic compounds. Periodic air monitoring will occur to ensure the effectiveness of the off-gas treatment system in eliminating contaminants from the treated air stream. Confirmation sampling of deep soils would be performed to insure cleanup goals are met.

The preferred alternative for Details G and H involves additional subsurface soil samples and laboratory analysis to ensure that contaminant concentrations are below cleanup goals. The relatively low concentrations of contaminants in subsurface soils at those source areas indicate that the risk to human health and the environment are within the acceptable range.

Statement of the Continued Protection of Human Health and the Environment
The selected remedial alternative provides adequate protection for human health by preventing ingestion of surface soils and leaching of contaminants to the groundwater. This alternative is fully protective of the environment by removal of the contaminated surface soils, sediments, and surface water.

APPENDIX F.3

Site Name: Chemical Spill-11 Former Pest Control Area

Site Description

Study Area CS-11 consists of Building 1116, formerly used as the ANG and ARNG pest-control storage and mixing area (Figure 6). During the SI, the study area was nearly level, with no significant topographic features. An asphalt pad was present immediately east of the building, and the areas immediately north, west, and south were grassed. South of. MW-1, the study area was lightly wooded, with grass 1–2 feet high.

This study area was identified in the MMR records search as an area of potential contamination (E.C. Jordan Co., 1986a). According to the records search, from 1970 to 1983, pesticides and herbicides were mixed on an unbermed asphalt pad located on the eastern side of the building (E.C. Jordan Co., 1986a). Reportedly, pesticides that spilled while being mixed were washed off the edge of the pad onto the surrounding soil. No major pesticide spills were reported, and pesticides are not currently stored at Study Area CS-11.

In 1983, when the pesticide shop was closed, approximately 200 pounds of pesticides were removed from Building 1116, including traditional chlorinated compounds such as Lindane and more modern organophosphorus pesticides such as Malathion and Sevin. No documentation was found that other pesticides such as 4,4'-DDT and dieldrin were stored in Building 1116; however, they were detected in soil surrounding the building.

The primary contaminants potentially released at Study Area CS-11 are pesticides and herbicides from spills during the historical handling and mixing of these solutions. A summary of the nature and distribution of contaminants detected during the SI, focusing on soil, is presented in this subsection. Contaminants of potential concern (CPCs) based on analytical data for surface soil . Additional discussions of Study Area CS-11 are in the Priority 2 and 3 Study Areas SI report (ABB-ES, 1993).

VOCs, SVOCs, pesticides and PCBs, and organophosphorus pesticides were not detected in groundwater samples collected from MW-1 during the three rounds of sampling. Inorganic analytes were not detected above MMR background concentrations.

To identify potential risks associated with exposures to study-area-related CPCs, a sitewide preliminary risk evaluation (PRE) was conducted for surface soil at Study Area CS-11, including both human health and ecological exposure scenarios.The PRE indicates that concentrations of dieldrin, arsenic, and beryllium in surface soil at Study Area CS-11 could cause unacceptable potential risks for future human residents. However, the maximum concentrations of beryllium (0.71J mg/kg) and arsenic (5.6 mg/kg) identified at TP-3, are only slightly above MMR background (0.65 mg/kg and 3.6 mg/kg respectively) but below the range observed in sandy soil. Therefore, any potential risks associated with beryllium and arsenic are mostly or all attributable to background concentrations.

Evaluation of ecological exposure scenarios conclude that concentrations of dieldrin, cadmium, chromium, cyanide, lead, and zinc exceed ecological receptor hazard equivalent concentrations (HECs) for Tier I assessments. In addition, concentrations of dieldrin and several inorganics result in a hazard index (HI) in excess of 1.

Discussion of Remedial Objectives
A removal action was recommended for this study area as a result of information collected during the Priority 2 and 3 Study Areas SI report (ABB-ES, 1993). A more detailed description of remedial objectives is contained in Appendix F.1.

Areas of Noncompliance
There are no areas of noncompliance.

Recommendations
It is recommended that the selected remedy for Priority 2 and 3 study areas be implemented as proposed. See appendix F.1 for detail.

Statement of the Continued Protection of Human Health and the Environment
The selected alternative will meet removal action objectives and provide protection of human health and the environment at the study areas. See appendix F.1 Statement of the continued protection of human health and the environment for detail.

APPENDIX F.4

Site Name: Chemical Spill-15 Former Engine Run Up Area

Site Description:

Study Area (SA) CS-15, a former jet engine testing site, is located on the southeast side of MMR, on Riley Street (Figure 6). This SA consists of Building 202, which is an outside testing stand, Building 204, an enclosed testing stand, and the area surrounding these buildings. The SA was used for engine testing from 1949 until 1985, and during the SI, it was abandoned.

The site had a chain-link fence gate to restrict vehicle access. The areas immediately surrounding the paved portion of the SA were grass covered with woods beyond the grass. Grass was sparse around the former engine-testing pad, however, no staining was apparent. The cleared portion of the site was nearly level and the ground surface sloped to the southeast along the east and south tree line.

CS-15 was evaluated as part of the Task 6 Records Search (E.C. Jordan Co., 1986a). According to the record search, engines were tested inside Building 204 from 1949 to 1954. Wastes generated during this time were washed to a floor drain that led to a gasoline trap outside the eastern side of Building 204. After passing through the gas trap, effluent passed through an underground pipe to an open ditch, southeast of the SA. Flow from this ditch appeared to slow near Riley Street. It appeared teat flow that did not percolate into the soil would move into a culvert under Riley Street, and would continue to an open intermittent drainageway south of the road.

From 1954 to 1985, engine testing was performed outside at "Building 202," which is a steel frame designed to hold the engines while being tested. It was estimated that from 1949 to 1970, 180 gallons per year of JP-4 and AVGAS, and 1,000 to 15,000 gallons per year of petroleum distillate (PD-680), were generated as waste (E.C. Jordan Co., 1986a).

From 1954 to 1970, wastes were washed off a concrete test pad and onto the ground. After 1970, the only waste generated was JP-4, which was picked up for disposal by an outside contractor (E.C. Jordan Co., 1986a).

A secondary source of potential contamination not identified in the record search at the SA, were three hanging transformers west of Building 204. These transformers were observed and identified as possible additional sources of contamination during the SI field program because stained soil was observed below the transformers. The area of stained soil was approximately 6 feet by 8 feet.

During Phase 3 of the field investigation, approximately 40, 55-gallon drums were observed on the former engine-testing pad. Many appeared to be full and some were labeled as engine lubricant and hydraulic oil. There were also seven empty USTs that appeared to have been removed from other locations. The rear door of Building 204 was open and several small containers of paint, oil, and other products were observed. An 8-foot by approximately 25-foot

tank was also observed in Building 204; its contents, if any, are unknown. These drums and USTS, although stored on-site, are not considered part of SA CS-15 and, therefore, were not sampled.

A report titled *Priority 2 and 3 Study Areas, Site Investigation, MMR, October 1993* (HAZWRAP) describes explorations conducted at the SA and discusses the rationale for exploration locations. A summary of soil sampling and monitoring well completion details is also presented. In addition, samples collected for on-site chemical screening and off-site laboratory analysis are summarized.

Discussion of Remedial Objectives:
Based on the past uses of CS-15, fuels and solvents may have been spilled and released at the SA during engine testing. In addition, oil-containing PCBs from overheated transformers may have leaked. The remedial objective of further site investigations were to provide an exploration program including test pits, monitoring wells, analytical results, hydrogeological investigations and a preliminary risk evaluation to determine what further actions may be necessary.

Areas of Non Compliance:
There are no areas of non-compliance.

Recommendations:
Based on the limited habitat at the site, as well as the relatively small areas of contaminated soil, no further action is recommended contingent upon the SRIP investigation of the gas trap.

Dieldrin soil HEC exceedances should be addressed as part of a MMR base-wide program

The data collected during the SRIP activities on the gas trap should be evaluated in combination with this SI data. The recommended disposition of the site should be based on the results of this evaluation.

Statement of Continued Protection of Human Health and the Environment:
In the drainage course leading from the gas trap, PCBs were detected at concentrations in excess of soil ecological HECS. In addition, detected concentrations of mercury, cadmium, lead, copper, and zinc also were in excess of soil ecological HECs in samples from this area. Copper and zinc were also detected at MW-2 in concentrations in excess of soil ecological HECS. In addition, humans and ecological receptors may also be exposed to unacceptable concentrations of PAHs if exposed to soil below the former suspended transformers. The concentration of three PAHs detected in stained soil below the former suspended transformer exceeded human health soil HECs and concentrations of several PAHs exceeded ecological HECs for indicator species. However, the observed concentrations of many PAHs were below the concentrations documented to occur in urban soil.

Based on the results of the PRE, ecological receptors may be exposed to concentrations of contaminants that may pose an unacceptable risk in two areas of the site, however, the limited habitat and the small area that has been impacted indicates minimal exposure will likely occur.

APPENDIX F.5

Site Name: Chemical Spill-16/Chemical Spill-17 STP Sludge Disposal

Site Description

Areas of contamination (AOCs) CS-16 and CS-17 occupy approximately 80 acres along the southern MMR boundary near the Falmouth gate (Figure 6). The site is situated in the southeast portion of the cantonment area of MMR. The closest on-base housing is located approximately 1.2 miles to the west. The closest off-base housing is located east of Sandwich Road, approximately 500 feet from the AOCs. These areas consist of infiltration sand filter and sludge drying beds located adjacent to the former MMR sewage treatment plant (STP). The STP disposed of treated effluent by discharging it to these sand filter beds. In the past, waste battery electrolyte, cleaners, solvents, and paint thinners from various operations at MMR are believed to have been discharged to the sanitary sewer system. It is expected that metals and organic chemicals contained in these waste materials partitioned to organic matter and concentrated in the treatment system sludges (HAZWRAP, 1994b). The former STP was being dismantled and salvaged during the RI. Demolition of the former STP was completed in 1997. None of the sand filter beds or sludge drying beds at AOCs CS-16/CS-17 are being used. A new STP is located north of the former STP. Treated effluent is pumped to filter beds near the Cape Cod Canal.

AOC CS-17 includes the following operable units:

- Abandoned sludge drying beds: Six abandoned sludge drying beds are located east of the STP. Each bed has an area of approximately 50 square feet and is separated from the adjacent bed by a rotted wooden plank barrier approximately 1 foot high.

- Drum disposal area: This area is located immediately north of the former sewage sludge drying area.

- Former sewage sludge disposal area: This is a 3- to 4-acre area southeast of the former STP characterized by numerous, nearly continuous mounds resembling what would remain after material was dumped from a dump truck Two suspected sludge piles were identified in the pine wooded area. The first pile was approximately 40 by 20 feet in size and 1.7 feet deep.

The Ashumet Valley plume originates at the former Fire Fighter Training Area I (FTA-1), with contribution from the decommissioned MMR STP (CS-16/CS-17) about 1,000 feet to the south. Treatment of contaminated soils at FTA-1 began in June 1995 and was completed in September 1997. A total of 47,172 tons of soil was treated using a thermal treatment process. Soil cleanup objectives were met, the area was restored, and the source area no longer contributes to the Ashumet Valley groundwater plume. Activities to address soil contamination at CS-16/CS-17 are discussed in the following paragraphs. Groundwater contamination associated with the CS-16/CS-17 site is being addressed as part of separate studies under the Plume Response Plan.

AFCEE activities at CS-16/CS-17 carried out under the Installation Restoration Program (IRP) include performing an RI to characterize the nature and extent of contamination. Risk assessments were conducted as part of the RI to identify potential risks to human health and the

environment. The risk assessments evaluated the present and future risks to human and environmental receptors that may contact contamination under current conditions, assuming no remedial action is taken. Cancer and noncancer risks were evaluated. Additional activities included preparation of a feasibility study (FS) to identify and evaluate a range of remedial alternatives.

The proposed plan (August 1998) summarizes the RI and FS and presents remedial alternatives proposed for soil cleanup at three source areas at CS-16/CS-17. After careful consideration of several alternatives, AFCEE believes the proposed actions composing the AFCEE preferred alternative will protect human health and the environment and will comply with applicable environmental laws and regulations. The proposed plan, which is based on the FS, describes various remedial alternatives and the AFCEE preferred alternative. The Proposed Plan was approved in late Fall of 1998. The Draft Final Record of Decision is currently undergoing review.

Discussion of Remedial Objectives

Risk-based cleanup goals were established to support the development of remedial alternatives that will mitigate potential risks associated with AOCs CS-16/CS-17. The risk-based cleanup goals are based on the preliminary risk assessment (PRA) conducted during the RI by ABB. The conclusions of the PRA were the basis for estimating cleanup goals.

STCLs are MMR-specific risk-based concentrations that were developed for protection of human health and the environment for areas inside the flightline and outside. STCLs for areas outside the flightline would be appropriate for these AOCs. Because no unacceptable risk was posed by maximum concentrations in the human health risk assessment, STCLs were revised to include only the ecological risk component.

The remedial action objectives (RAOs) identified were the protection of ecological receptors by preventing bioaccumulation of identified COCs and the reduction of methylene chloride concentrations to levels not likely to cause risk if leached to groundwater.

The following response objective was identified for AOCs CS-16/CS-17.

- Reduce exposure of ecological receptors to COCs in the active sludge beds, inactive sludge beds, and former sludge disposal area surface soil that result in unacceptable risk.
- Reduce detected concentrations of methylene chloride to levels not likely to cause risk if leached into groundwater.

Guidance for the use of MMR STCLs require the following (HAZWRAP 1996):

- The maximum detected concentration of contaminants identified as posing unacceptable risk in the PRAs was compared to chemical-specific STCLs for outside the flightline (considering ecological receptor exposure to 0–2 feet bgs). AOCs where these contaminants were detected in maximum concentrations exceeding STCLs were identified as requiring response actions to achieve the response objectives.

- Maximum detected concentrations of leachable organic compounds (K_{oc} less than 1,000) were compared to STCLs. AOCs where leachable organic compounds were detected in concentrations exceeding the corresponding STCLs were identified as requiring response actions.

- Maximum detected concentrations of TPH were compared to the STCL for TPH outside the flightline (500 mg/kg). There were no AOCs where TPH was detected in concentrations exceeding the STCL.

Areas of Noncompliance
There are no areas of noncompliance.

Recommendations
Recommend implementing the selected remedy. The selected alternative involves the removal of surface soil with concentrations of COCs exceeding STCLs, on-site treatment by asphalt batching, and using the asphalt as subgrade paving for roads and parking areas at other MMR locations. This alternative will reduce potential ecological risks and minimize the potential impact of leachable COCs on groundwater. Soil samples collected from AOCs CS-16/CS-17 indicated the presence of sand, silt and sludge. Asphalt batching of this type of contaminated material will produce a nonleachable, cohesive material. Asphalt-batching will dilute the presence of silt and sludge found in the contaminated surface soil with large quantities of aggregate before incorporating this contaminated material into asphalt.

Implementation of the asphalt-batching processes at the AOCs will take approximately 12 months to complete. Monitoring site conditions will involve collecting and analyzing groundwater samples and inspecting site conditions.

Statement of the Continued Protection of Human Health and the Environment
The PRA developed conservative estimates of risk to potential human and ecological receptors based on assumptions presented in the MMR RAH (HAZWRAP, 1994a). The RAH describes procedures and provides support information for risk assessment activities at MMR. The RAH provides a framework to streamline the risk assessment process and summarizes site-specific approaches to reservation wide risk assessment.

The RAH provides target risk levels for comparison to estimated risks at MMR. The RAH identifies target risk levels consistent with the U.S. Environmental Protection Agency's (USEPA) guidelines: the total incremental carcinogenic risk for an individual should not exceed 1×10^{-4} to 1×10^{-6} and the HI should not exceed 1.0. The Massachusetts Contingency Plan (MCP) sets the target carcinogenic risk level at 1×10^{-5} and the HI level at 1.0. The PRA considers incremental carcinogenic risks exceeding 1×10^{-4} and HIs exceeding 1.0 (for human health and ecological receptors) as significant.

Risk estimates included in the PRA represent conservative worst-case scenarios for exposure to COCs. For AOCs CS-16/CS-17, risk estimates were presented in the final RI prepared by ABB.

The risk-based cleanup goals established in this section are considered to be consistent with the estimated site risks developed based on conservative exposure scenarios.

No unacceptable risks to human receptors were identified at AOCs CS-16/CS-17. The exposures to COCs at AOCs CS-16/CS-17 resulted in unacceptable risk to white-footed mouse, short-tailed shrew, and grasshopper sparrow based on maximum detected concentrations of COCs. These ecological receptors were found to be at risk from Aroclor 1254 and dieldrin. The ecological risk from the inorganic contaminants was deemed to be manageable given the uncertainty in the risk assessment.

Surface soil contaminants will be stabilized in such a manner that contact between human and ecological receptors will be limited such that excess potential risk will not result. This stabilization process will also minimize the potential for surface soil contaminants that exceed the risk-based STCLs to leach into the groundwater. Therefore, this alternative will be protective of human health and the environment.

APPENDIX F.6

Site Name: Chemical Spill-16/Chemical Spill-17 DDOU

Site Description

The DDOU consists of a clearing in a wooded area located southeast of the former MMR sewage treatment plant at AOC CS-16/CS-17 (Figure 6). A sanitary sewer sludge disposal area is located southwest of the DDOU. The ground slope in the area of the DDOU is nearly level with no severe slopes. Hummocks and other surface features were observed in the more densely wooded area southwest of the DDOU in the area formerly used for sludge disposal. A trench feature also was observed at the DDOU that contained black sludgelike material (Advanced Sciences, Inc. [ASI], 1997).

The DDOU was discovered during RI activities at AOCs CS-16/CS-17 in 1994. A total of 11 drums was observed in the area on the ground surface. After discovery of the drums, the National Guard Bureau (NGB) removed the drums from the site, analyzed the contents, and disposed of them accordingly. Based on this discovery, two surface-soil samples were collected and analyzed as part of the AOC CS-16/CS-17 RI. Results of sample analysis indicated that the two surface samples contained pesticides and other analytes. The pesticides, particularly 4,4'-DDT, 4,4'-dichlorodiphenyldichloroethane (DDD), 4,4'-dichlorodiphenyldichloroethylene (DDE), and alpha-benzene hexachloride (BHC), were found at concentrations up to several hundred milligrams per kilogram. Based on these findings, an investigative program was conducted by ASI in 1994. As part of the 1994 investigation, ASI completed four soil borings as monitoring wells, completed 22 Geoprobe borings, and collected 10 surface soil samples. The following subsections discuss results of analyses and screening conducted on soil and groundwater samples.

The ASI report identified two areas of soil contamination that contained pesticides above MMR STCLs; one area measuring approximately 60 by 40 feet (Area 1) encompassing Drum Nos. 1 through 7 and the other approximately 20 by 50 feet (Area 2) inclusive of Drum Nos. 9 through 11. SVOCs and inorganic analytes at concentrations above STCLs were found commingled in the two areas of pesticide contamination. Data from Area 1 indicated 4,4'-DDT concentrations in surface soil (i.e., SS-8) as high as 36,000 mg/kg. In the same location, concentrations of 4,4'-DDE and 4,4'-DDD were reported at 450 and 3,800 mg/kg, respectively. The pesticide alpha-BHC also was found at concentrations above the STCL. The highest concentration, 490J mg/kg, was reported at sample location SS-8. SVOCs were found in excess of STCL in a small portion within Area 1, which encompasses Drum Nos. 4 and 5. In addition, several inorganic analytes, including arsenic, chromium, lead, vanadium, and zinc, were found at concentrations exceeding respective STCLs within this area.

A PRE was not conducted for this study area. Additional information and data on the DDOU is in the Final Technical Memorandum (ASI, 1997).

Discussion of Remedial Objectives
Removal action objectives were developed and established to achieve the overall objective of protecting human health and the environment for the Priority 2 and 3 study areas as described in appendix F.1.

Areas of Noncompliance
There are no areas of noncompliance.

Recommendations
It is recommended that the selected remedy for CS-16/CS-17 DDOU as described for the Priority 2 and 3 sites be implemented as described in appendix F.1.

Statement of the Continued Protection of Human Health and the Environment
The selected alternative will meet removal action objectives and provide protection of human health and the environment at the study areas. See appendix F.1 for detail.

APPENDIX F.7

Site Name: FTA-1 Current Fire Training Area (Source)

Site Description

Former FTA No. 1 is located 500 feet north of Kittredge Road near the southern boundary of MMR. The base STP lies between the AOC and the MMR boundary, which is approximately 1,800 feet south of AOC FTA-1 (Figure 6). The AOC consists of a level, cleared area of approximately 3 acres that was used by the MMR fire department for fire-training activities from 1958 to 1985. The AOC was closed in November 1985 because of air emission permitting difficulties.

Six to 16 fire-training exercises were held annually in designated areas of the AOC, during which flammable waste liquids from the flightline area were burned and extinguished (Metcalf and Eddy, Inc., 1983). Fire-training activities consisted of dumping flammable materials onto a concrete pad or into unlined pits, igniting, and extinguishing the fires with water, foam, or dry chemicals. The residual mixture would evaporate or infiltrate into the soils overnight, and the remainder was burned off the next day to eliminate any fire hazard (E.C. Jordan Co., 1988). The materials burned included jet fuel (i.e., JP-4), AVGAS, MOGAS, diesel fuels, waste oils, solvents, paint thinners, transformer oils, and spent hydraulic fluids. Substances used to extinguish fires included carbon dioxide, protein foam, aqueous film–forming foam, a bromine-based dry powder, and liquid chlorobromomethane.

The technical approach developed for the RI program partitioned AOC FTA-1 into two operable units: (1) the FTA-1 source operable unit and (2) the FTA-1 groundwater operable unit. To accomplish the scope of the RI, the field exploration program was designed to be operable unit specific. Results of the FTA-1 source operable unit RI confirmed the presence of fuel- and solvent-related contamination in soils throughout the cleared portion of the AOC and in the sediments and surface water perched in the drainage pit. Residual contamination was highest in shallow soils (i.e., less than 10 feet deep) beneath and adjacent to the concrete pad in the center of the site clearing. In addition, PCBs, pesticides, and low levels of dioxin were detected in surface soils. Lead was consistently detected at levels greater than 10 times background levels for the MMR, and the water in the drainage pit exceeded the state and federal MCLs for lead. Contamination found at AOC FTA-1 is a direct result of the infiltration of unburned wastes during historical fire-training activities.

Several classes of contaminants detected in AOC FTA-1 (i.e., inorganics, SVOCs, pesticides, PCBs, and dioxins) are stable in soil environments and will remain in the soils. In contrast, the VOCs in the soil (i.e., BTEX and chlorinated solvents) will leach to groundwater and continue to contaminate that medium. Results of the FTA-1 groundwater investigation are presented in the interim RI report for the groundwater operable unit.

A PRA was conducted to evaluate potential risks from the most probable exposure scenario at the FTA-1 source operable unit (i.e., children from nearby residential areas playing in the soil and being exposed through dermal contact and incidental ingestion). The estimated carcinogenic risks from such exposure routes are at the low end and within the USEPA target risk range. The

noncarcinogenic risks are less than the USEPA target hazard index (HI) of 1.0 and do not indicate a significant human health risk. The draft results from the FTA-1 source operable unit investigations have been assessed in an EE/CA prepared to address remedial alternatives for AOCs FTA-1, FS-25, and CS-4 at MMR. The EE/CA is the foundation for the planned removal action of an estimated 16,500 cubic yards of soil from AOC FTA-1. Contaminated soil was excavated and treated using a low-temperature thermal treatment process. Treated soil was backfilled into the excavated area and is detailed in *MMR Plume Response Program, Draft Closure Report, FTA-1, October 1997.* A *Draft Remedial Action Summary Report, FTA-1, May 1998* has been submitted and is undergoing regulatory review.

Discussion of Remedial Objectives

Specific AOCs addressed under removal action specifications (ABB-ES, 1992b), herein referred to as the Soil Thermal Treatment Program, have been previously characterized through site and remedial investigation activities by NGB. From these investigations it was determined the AOC source area soils were contributing, or may have potential to contribute, contaminants into environmental media. Because of existing regulation under federal and Commonwealth of Massachusetts guidance, NGB determined that these AOCs should be remediated.

An EE/CA (ABB-ES, 1991a), provided identification of remedial objectives and determination of Removal Action alternatives. A contaminant source Removal Action memorandum and a detailed design package were completed in 1992 (ABB-ES, 1992a and 1992b). The performance-based Removal Action design was based on contaminated soil excavation/removal; low-temperature thermal desorption of contaminants from soils; segregation and disposal of various process-generated media (i.e., dust, condensate); treatment of process air stream discharge to 95 percent efficiency; and verification of soil treatment and excavation closure based on comparison of chemical analysis to predetermined soil treatment criteria.

Thermal treatment devices employed successfully treated approximately 60,000 tons of VOC- and TPH-contaminated soils. As a result of this soil treatment, approximately 1 ton of baghouse dust; 10,000 gallons of condensed fuels and/or oils; 805,994 gallons of condensed industrial wastewater; 7,300 tons of oversized classified debris (i.e., woody waste, rocks); and 179,000 pounds of aqueous- and vapor-phase granular activated carbon were generated, managed, and disposed of at appropriately licensed and/or permitted transportation and disposal facilities. Upon achieving laboratory-verified treatment criteria, through testing at preapproved volume increments, treated soils were returned to excavation areas for backfilling as directed by the specifications.

All laboratory analytical data, process treatment records, quality control, and project records are on file at the MMR IRP offices at the Otis ANG Base. Harding Lawson Associates (HLA) was contracted through HAZWRAP for construction technical support services throughout the contract period. Technical support service reviews and inspections indicate the Removal Action was conducted in compliance with the contract documents and technical specifications. The project was found to be substantially complete in October 1997.

Areas of Noncompliance
Currently there are no areas of noncompliance.

Recommendations
The AOCs and contaminated soils associated with the Soil Thermal Treatment Program have been successfully remediated.

The site is recommended for closure.

Statement of the Continued Protection of Human Health and the Environment
Upon completion of the planned remedial activities at the FTA-1 site detailed in the site closure report (1997), and after reviewing the associated analytical results of the thermal treatment, AFCEE recommends that the site is prepared for closure. The analytical results support the recommendation for closure as the site does not pose a risk to human health and the surrounding environment.

APPENDIX F.8

Site Name: Fuel Spill-1 AVGAS Test Dump Site (Source and Plume Area)

Site Description

This industrialized region includes structures, runways, and taxiways for the support of flight operations. The FS-1 source area [considered the Western Aircraft Turnaround (WAT)] is located within the flightline area (Figure 6). The WAT is constructed of concrete and asphalt and is located in an area once used as a source for borrow material. The area containing the WAT is sparsely vegetated, and the northern and southern boundaries of the borrow area are denoted by steep soil slopes capped by heavily vegetated forest.

Although land use in areas adjacent to MMR is mainly residential, recreational, and agricultural, few residences exist in the area between the FS-1 source area and the suspected discharge point for groundwater (cranberry bog and the Quashnet river). The off-base land adjacent to this portion of MMR is heavily wooded and undeveloped with the exception of one home at the end of Ashumet Road, cranberry bogs, and an abandoned borrow pit. Ashumet and Johns Pond are located in the general vicinity but are not expected to be affected by contamination from AOC FS-1. Agricultural land adjacent to this portion of MMR includes active cranberry bogs located east of Johns Pond and south of the MMR base boundary. The Township of Mashpee has investigated one area south of the FS-1 source area for the potential site of a drinking water well (P-11) (D.L. Maher, 1992).

For the source area, the human health risk assessment concluded that there were no risks posed by exposure to surface soils, however groundwater in the source area had detections of toluene, methylene chloride, arsenic, and lead that pose a potential risk in residential scenarios. Minimal concentrations of regulated compounds were quantified during field investigations. Compound-specific VOCs were not quantified with one exception. Elevated levels of methylene chloride were detected. However, it was assumed that the detection was not site related because there was no site history of its use at FS-1. The only SVOC detected was BEHP in a single soil boring sample. Lead was the only metal detected above background in subsurface soils. No VOCs or pesticides/PCB were detected.

The distribution of EDB in groundwater from the northernmost detection point to the discharge at the cranberry bogs is approximately 6000 feet in length, 600 to 1200 feet in width, and 50 to 100 feet thick. The estimated volume of contaminated groundwater contained in the plume is 911 million gallons, including 2.7 gallons of EDB. The plume is thickest at the leading edge where the contamination begins at the surface to a depth of 180 feet below the ground surface.

Discussion of Remedial Objectives

FS-1 RI Report concluded that action was warranted to address risks from exposure to groundwater and surface water, therefore RAOs have been developed and presented in the Revised Draft Feasibility Study.

A pilot test of a Groundwater extraction system at the toe of the FS- I plume in the Quashnet River area bogs was performed to:

- Implement and evaluate an extraction, treatment, and discharge system to intercept EDB-contaminated Groundwater at the leading, edge of the FS-1 plume;
- Protect human health by reducing the risk from EDB in surface water, groundwater, and cranberry crops, while minimizing impacts to ecological systems;
- Accelerate the restoration of the Quashnet River currently impacted by elevated EDB concentrations

The components of the system include: a deep extraction well (EW-5, screened from '90' to 150' MSL); shallow well points; granulated activated carbon treatment plant for EDB contaminated groundwater; berms, and discharge to surface water and to subsurface. System start-up is scheduled for April 1999.
The final cleanup levels for remediation at AOC FS-1 are as follows:

COC	Cleanup level
arsenic	50 µg/L
EDB	0.02 µg/L
lead	15 µg/L
toluene	1000 µg/L

Areas of Noncompliance
There are no areas of noncompliance.

Recommendations
Another Five-year review is recommended since it is expected that Groundwater cleanup levels will not be attained within five years.

Statement of the Continued Protection of Human Health and the Environment
With successful implementation of the pilot test system at the leading, edge of the FS-1 plume, groundwater contaminants will be removed from the aquifer. In addition, surface water concentrations of the EDB will be reduced thereby reducing risks from exposure to surface water. The body of the FS-1 plume underlies Town of Mashpee conservation land and does not currently impact any public water supplies. Also, lead and VOCs in the groundwater within the source area, the aircraft turnaround area, does not pose a risk since groundwater in this area is not used.

Operations of the pilot test system will be closely monitored due to the sensitive habitats found in the area of the Quashnet River bogs. An ecological sampling plan has been developed to ensure that the treatment system does not impact a sensitive brook trout habitat.

APPENDIX F.9

Site Name: Fuel Spill-4 Current Product Tank 100/101

Site Description

Study Area FS-4 consists of the area surrounding the former Building 178, a fuel pumphouse, located on the base airfield (Figure 6). During Phase 3 of the SI, Study Area FS-4 was observed to be nearly level, with grass around the pavement and building to the west, north, and south. East of the study area was a large expanse of tarmac. This study area is within the restricted zone of the flightline, and access can be gained only by authorized personnel.

Although the USTs at the study area were discussed in the Task 6 records search, the site did not become a formal study area until one UST failed a leak test. Between 1985 and 1989, the USTs at the study area were tested; test results indicated that CPT-7 was leaking. CPT-7 was one of five USTs, CPT-6 through CPT-10, located at the pumphouse, that were installed in 1956. The USTs were removed in 1994 under the FSU program. CPT-6 through CPT-9 had a 25,000-gallon capacity and were used to store AVGAS. CPT-10 had a 2,000-gallon capacity and was used to store diesel fuel but was reported empty at the time of the records search (E.C. Jordan Co., 1986a).

During Phases 1 and 2 of the SI field program, CPT-7 reportedly was used to store deicer fluid; CPT-6, CPT-8, and CPT-9 continued to store AVGAS. CPT-10 reportedly was empty. Each of the five USTs, including CPT-7, passed leak tests conducted by the ANG in October 1989. According to MMR personnel, CPT-7 was empty and not being used in 1993.

In 1994, the five USTs at Pumphouse 178 were removed along with a 25,000-gallon defueling UST located east of the former pumphouse. The pumphouse was demolished to gain access to the underlying USTs. According to the UST closure reports (Metcalf & Eddy [M&E], 1994), PID headspace readings up to 3,200 ppm) were recorded on soil from 22 feet bgs from the excavation of the 25,000-gallon defueling UST. In the excavation for the 2,000-gallon collection UST (i.e., CPT-10), final PID headspace readings as high as 850 ppm were recorded at 10 feet bgs.

Study Area FS-4 geology consists of 4 to 6 feet of fill with a consistency of silty sand, and fine-to-medium sand overlying outwash sand. The outwash sand was typically identified as a well-sorted, medium-to-coarse grading to medium sand with trace gravel. Explorations were terminated in the outwash, approximately 66 to 70 feet bgs, or approximately 40–43 feet above mean sea level (MSL).

To identify potential risks associated with exposures to study-area-related CPCs, a sitewide PRE was conducted for surface and subsurface soils at Study Area FS-4, including both human health and ecological exposure scenarios. The PRE was intended not to quantify study area–specific risks, but rather to indicate whether risks above regulatory guidance levels are possible. A detailed discussion of the PRE methodology is in the RAH (ASG, 1994). The PRE was completed in 1995. Due to the relatively low concentrations of compounds detected during the Supplemental Investigation, the PRE was not updated to include those results.

Results of Tier I of the human health PRE showed no HEC exceedences for surface or subsurface soil. Tier I HECs for BEHP and cadmium were exceeded in Phase I groundwater samples from the study area. Tier II human health HEC exceedences were not identified in groundwater. However, maximum BEHP and cadmium concentrations exceeded their respective MCLs.

Tiers I and II of the ecological PRE showed that maximum surface soil concentrations of several PAHs, as well as dieldrin and arsenic, exceeded the lowest HECs. HIs for the upland sandpiper exceeded 1 for organics but were less than 10 for inorganics. Organic and inorganic HIs for both the meadow vole and the red fox were below 1 and 10, respectively. The organic HI for plants exceeded 1, although chemical-specific hazard quotients (HQs) were all less than 1. The inorganic HI for plants was less than 10.

The draft Priority 2 and 3 Study Areas SI report recommended that no further action be conducted at this study area depending on results of FSU program activities. Based on qualitative data obtained during removal of USTs at this study area, residual fuel contamination exists below the former 2,000-gallon collection tank and the former 25,000-gallon defueling UST. According to the text and tables in the UST closure report (M&E, 1994), PID headspace readings as high as 3,200 ppm were reported for soil collected from 22 feet bgs at the 25,000-gallon defueling UST location. Each soil sample collected from the side walls of the excavation was 150 ppm or less, with the exception of a sample obtained from the southern side of excavation at 8 feet bgs. According to the UST closure report, the final size of the excavation was approximately 40 feet wide by 60 feet long and 22 feet deep.

PID headspace readings as high as 850 ppm were reported for samples collected from the bottom excavation (i.e., 10 feet bgs) for the 2,000-gallon UST. Each side wall sample collected from this excavation had 0 ppm headspace readings (M&E, 1994). According to the UST Closure Report, the final size of the excavation was approximately 10 feet wide by 20 feet long and 10 feet deep. Qualitative PID headspace results obtained during the UST removals are the basis for this study area being included in the EE/CA.

Discussion of Remedial Objectives

At Study Area FS-4, residual fuel contamination from past UST releases may be present in subsurface soil, and may have the potential to leach to groundwater. AFCEE requested a removal action at this study area based on elevated PID readings during the FSU program.

- Removal action objectives were developed based on these considerations and were established to achieve the overall objective of protecting human health and the environment. Details and schedule of remedial action for this site are contained in appendix F.1.

Areas of Noncompliance

There are no areas of noncompliance.

Recommendations

A low-flow SVE system will be constructed at Study Area FS-4 to remove contaminants from deep subsurface soil, if necessary. The details of the recommendations for Priority 2 and 3 sites are contained in Appendix F.1.

Statement of the Continued Protection of Human Health and the Environment
The selected alternative will meet removal action objectives and provide protection of human health and the environment at the study areas. See appendix F.1 statement of the continued protection of human health and the environment for details.

APPENDIX F.10

Site Name: Fuel Spill-7 Current Product Tank 115

Site Description

Study Area FS-7 is located adjacent to the former Building 1820 on the northwestern rotary (Figure 6). The area north, east, and south of this building was observed to be grassed with pavement on the western side of the building. The study area was nearly level with no significant topographic relief. Buildings 1640 and 1670 were formerly located south of Building 1820, but had been removed prior to 1990.

Study Area FS-7 was evaluated as part of the Task 6 records search (E.C. Jordan Co., 1986a). According to the records search, CPT-115, a 500-gallon UST installed in 1970 and used to store No. 2 fuel oil, may have leaked up to 11,000 gallons of fuel. According to records, CPT-115 was removed in June 1985. It is unclear whether soil around the tank was removed or placed back in the excavation after tank removal. As part of the records search, the study area was ranked using the HARM system, receiving an overall score of 56.1, and the records search report recommended that a limited Phase II SI be conducted.

In 1996, Building 1820 at the study area was razed and the asphalt driveway that surrounded the building was removed.

Results of Tier I of the human health PRE for future residential use showed HEC exceedences for selected SVOCs, arsenic, and beryllium in surface soil, and benzene, arsenic, iron, and manganese in groundwater. Tier II human health HEC exceedences were not identified in soil or groundwater samples.

Tiers I and II of the ecological PRE showed that maximum concentrations of several organic and inorganic chemicals exceeded the lowest HECs. HIs for the upland sandpiper exceeded 1 for organics and equaled 10 for inorganics. For the white-footed mouse, there were no HEC exceedences of organic chemicals, and the HI for inorganics was less than 10. There were no HEC exceedences for the red fox, and both organic and inorganic HIs were less than 1. The organic HI for plants exceeded 1, although chemical-specific HQs for organics were less than 1. The inorganic HI for plants was less than 10.

The conclusion made based on data from Phases 1 through 3 of the SI were as follows:

- Maximum concentrations of arsenic, antimony, beryllium, cobalt, and manganese observed in surface soil samples at the study area were lower than the maximum concentrations of these analytes reported at MMR. It is likely that a majority of the analyte concentrations are naturally occurring with additions from nonpoint sources. Therefore, risks posed to ecological and human receptors are likely consistent with background concentrations and do not warrant further consideration.

- PAH concentrations are likely the result of nonpoint sources in this part of MMR. Sources include exhaust and minor releases (i.e., oil/fuel leaks in vehicles) from relatively heavy

motor vehicle traffic and exhaust from airplanes. Therefore, actions based on detected concentrations of these compounds do not warrant any further consideration as part of this study area.

- Results of the ecological PRE likely overestimate risk because use of the site area by the ecological receptors evaluated, to the extent assumed in exposure assessment, is unlikely. In addition, residential development of the area is unlikely in the near future. Therefore, adverse risk impacts are not expected to either ecological or human receptors.

Based on these conclusions, the following actions were recommended for Study Area FS-7:

- No further action is warranted for existing soil concentrations of inorganics because they are consistent with concentrations observed at MMR.

- Further sample collection is necessary to support the interpretation that PAHs were caused by nonpoint sources.

- Collection of subsurface soil samples from below the former UST is needed to evaluate the condition of soil if data cannot be obtained from the ANG.

In response to the last recommendation, a supplemental SI (SSI) was initiated and completed by Aneptek. The following section describes results and conclusions.

A supplemental phase of SI was conducted by Aneptek Corporation in 1995, consisting of the completion of one test pit, collection of six surface soil samples, and the completion of two soil borings (Aneptek Corporation, 1996). Each soil boring was completed as a monitoring well. A round of groundwater samples also was collected for off-site analysis. The data collected during the SSI were utilized to complete a second PRE for the study area.

Data collected during the SSI showed the presence of PAHs in surface soil above HECs at SS-6 and SS-4. Groundwater contamination documented during the initial SI and SSI was attributed to a fuel spill located upgradient of Study Area FS-7 (i.e., FS-13). Based on the SSI PRE, which showed exceedences of HECs by several PAHs, Aneptek Corporation recommended that a soil remediation be conducted to remove contaminants detected at SS-6.

Discussion of Remedial Objectives
Removal action objectives were developed for Priority 2 and 3 sites and are detailed in appendix F.1. Human and ecological recptors may be exposed to unacceptable risk from exposure to PAHs at Study Area FS-7.

Areas of Noncompliance
There are no areas of noncompliance.

Recommendations
Implement the selected remedy for Priority 2 and 3 sits as detailed in appendix F.1.

Statement of the Continued Protection of Human Health and the Environment
The selected alternative will meet removal action objectives and provide protection of human health and the environment at the study areas. See the statement of the continued protection of human health and the environment in appendix F.1 for details.

APPENDIX F.11

Site Name: Fuel Spill-9 Current Product Tank 108

Site Description

AOC FS-9 is located in the south central portion of MMR (Figure 6). The site has been and is being used for military vehicle maintenance. The site encompasses and area of approximately 7 acres and extends south a distance of approximately 720 feet from Building 1369 at the intersection of Beaman Road and West Truck Road to Building 1365. The paved portion of the site extends west a distance of approximately 120 feet, where it is bounded by undeveloped land. The undeveloped portion of the site extends to the west an additional 370 feet and includes a small vernal pool and drainage ditch, which originates at the western edge of the paved area

The developed portion of AOC FS-9 was a motor pool that remained in service from World War II until 1986. At the time of the RI field investigations, the site included five buildings (Buildings 1365, 1366,1367, 1368, and 1369); three 5,000-gallon steel USTs designated CPT-106, CPT-107, and CPT-108; a fuel island used for dispensing gasoline and diesel fuel; a catch basin located in the fueling area; and two waste disposal wells located adjacent to Buildings 1368 and 1369. Presently, the site includes the buildings and the closed leaching well. The USTs, dispensing pumps, and catch basin were removed during the FSU program. The waste disposal leaching well was cleaned and grouted in place during the DSRP.

The undeveloped portion of AOC FS-9 is primarily a grassy or pine covered area. Storm sewer headwalls discharge west of the paved portion of the site into a drainage ditch. The drainage ditch leads to a depression west of the site; the depression contains water for substantial parts of the year. This depression has been classified as a vernal pool. A portion of the undeveloped area immediately adjacent to the paved area but not within the drainage ditch or depression is referred to in the RI as the "waste disposal area." The nomenclature is retained in this study for clarity and continuity.

Some source control actions have already been conducted at FS-9. Three USTs and related fuel-dispensing equipment were removed as part of the MMR FSU program in August 1994. Under the DSRP, a catch basin and leaching well were removed and another leaching well was abandoned in place after decontamination of the structures and removal of all wastes. The DSRP is a systematic basewide investigation and cleanup effort to address drainage sumps that were used historically at MMR, including those at FS-9. Removal activities conducted under the DSRP are described more completely in *Drainage Structure Removal Program Remedial Action Workplan* (Jacobs Engineering Group, 1995). The DSRP activities will be summarized in *Drainage Structure Removal Program Remedial Action Summary Report* (ABB-ES, 1998), which is under review by USEPA and MADEP.

AFCEE's activities to date at FS-9 carried out under the IRP include performing an SI and RI to characterize the nature and distribution of contamination. Risk assessments were performed as part of the RI to identify potential risks from exposure to contaminants. The risk assessment evaluated the present and future risks to human health and the environment posed by existing conditions, assuming no remedial action is taken. Cancer and noncancer risks were evaluated.

Additional activities include preparing a feasibility study (October 1998) to develop and evaluate remedial action alternatives to reduce site risks and preparing this proposed plan.

The proposed plan (October 1998) summarizes the RI/FS and presents cleanup actions proposed for soils at three specific areas within FS-9. The proposed plan, which is based on the feasibility study, describes various cleanup alternatives and the AFCEE preferred alternative. After careful consideration of several alternatives, AFCEE believes the proposed actions composing the AFCEE preferred remedial alternative will protect human health and the environment and will comply with environmental laws and regulations. The proposed plan is currently undergoing regulatory review.

Discussion of Remedial Objectives

The potential risk to terrestrial ecological and human health receptors from exposure to soil was identified at FS-9. The MMR-specific risk-based STCLs and the MADEP MCP S-1/GW-1 standards define the soil concentrations protective of ecological and human health receptors. For those remediation options requiring soil removal or treatment based on risk assessment, the human health STCLs, background concentrations, and the MADEP MCP S-1/GW-I standards will be used as cleanup goals in the FS.

For AOC FS-9, response objectives were formulated for the former UST location (CPT-107/CPT-108), the TPH hot spot (TP-11), and the fence-line hot spot (SS-1) based on the environmental problems defined in the final RI, PRA, risk analyses associated with extractable petroleum hydrocarbon/volatile petroleum hydrocarbon (EPH/VPH) samples performed in accordance with MADEP guidance, and ARARs analysis. These response objectives are used to develop RAOs and appropriate remedial alternatives. Results of the field studies are presented in the RI report (CDM Federal, 1997).

The following response objectives were identified for AOC FS-9:

- Reduce exposure of human health receptors to the identified COCs (TPH, C_5–C_8 aliphatics, and lead) in the former UST location, TPH hot spot, and fence-line soil hot spot.

- Reduce exposure of terrestrial ecological receptors to identified COCs (chromium, vanadium, and zinc) in the former UST location and fence-line soil hot spot.

Guidance for the use of the MMR STCLs and MADEP MCP S-1/GW-1 standards require the following:

- The maximum detected concentration of contaminations identified as posing unacceptable risk in the soils was compared to the chemical-specific STCL for outside the flightline (human health considered soils ranging from ~10 feet and terrestrial receptors 0-2 feet). AOCs where these contaminants were detected in maximum concentration exceeding the STCL were identified as requiring response action to achieve the response objective.

- Locations for which MADEP type EPH/VPH TPH risk evaluation concentrations exceed MADEP thresholds protection of human health.

- Locations for which EPH/VPH TPH data or comparable data are unavailable require either confirmation sampling or remediation if TPH was quantified using noncompound/nonclass-specific methods at levels exceeding the STCLs. During confirmatory sampling as part of the Fuel Storage Systems Upgrade, detections of TPH exceeding the stated levels was found in the former UST location. Therefore, remedial actions are warranted.

The COCs identified by this process (TPH, CS-8, chromium, lead, vanadium, and zinc) and the associated MMR TCLs and MADEP MCP standards are presented in Tables 3-13 and 3-14. The final cleanup levels for remediation AOC FS-9 are as follows:

COC	Cleanup level
Chromium	6.8 mg/kg
Lead	300 mg/kg
Vanadium	15.2 mg/kg
Zinc	16.0 mg/kg
TPH	500 mg/kg with a goal of 200 mg/kg
C_5–C_8	100 mg/kg

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The cleanup goals established for soil at FS-9 are STCLs and MADEP soil cleanup standards, developed under the MCP. The STCLs are MMR-specific, risk-based and leaching-based concentrations protective of human health and the environment. STCLs were developed during the MMR DSRP. The MADEP standards were applied to address concerns regarding the potential presence of "nontarget hydrocarbons" including TPH and C_5–C_8 aliphatic hydrocarbons. The RI for FS-9 identified contaminants that pose unacceptable risk to human and ecological receptors from potential exposure to surface and subsurface soils. These contaminants were compared to risk-based STCLs and MADEP standards to determine the extent to which an area must be remediated.

Areas of Noncompliance
There are no areas of noncompliance.

Recommendations
Implemented the selected remedy. AFCEE's preferred alternative for FS-9 is Alternative 4, excavation and on-site asphalt batching with contingency low-flow SVE. AFCEE believes the preferred alternative provides the best combination of solutions for conditions and contaminants at each of the three source areas at the site. The excavation and on-site asphalt batching address the cleanup of soils at the three areas, and the in situ SVE addresses the potential cleanup of deeper soils if they are encountered at the former UST location. Monitoring would be conducted as required under CERCLA for at least five years to ensure the effectiveness of the removal/treatment activity. In addition, a five-year review will be performed.

Statement of the Continued Protection of Human Health and the Environment
The selected alternative will reduce the toxicity and mobility of soil contaminants through treatment. The reduction in toxicity and mobility will be attained by stabilizing the contaminants in an asphalt matrix or removal and destruction of the contaminants with the SVE system. The stabilized mass will have the structural and chemical binding properties to reduce the toxicity and mobility of the contaminants. This alternative will increase the volume of contaminated materials because of the introduction of additives (bulking agents, aggregate, and asphalt). The total volume of contaminated material may increase by 20 to 40 percent; however, the asphalt product from this process can be used as subgrade material for other paving projects performed at MMR. This alternative satisfies CERCLA's statutory preference for treatment as a principal component of a remedial action.

Soil contaminants will be stabilized, extracted, or destroyed so that contact with receptors will be limited such that excess potential risk will not occur. This stabilization process will also minimize the potential for soil contaminants to leach into the groundwater. Therefore, this alternative will be protective of human health and the environment.

APPENDIX F.12

Site Name: Fuel Spill-18 Fuel Transfer Point

Site Description

Study Area FS-18, a World War II motor pool and fuel transfer site, is located off North Gaffney Street, on the northwestern side of MMR (Figure 6). The study area slopes gently to the west of North Gaffney Street, with a small depression observed on the western side of the study area.

East of South Gaffney Street and south of North Gaffney Street, the topography slopes downward toward a drainage course. The drainage course receives storm-water discharge from the paved portion of Study Area FS-18. Flow from the outlet has created an intermittent drainage course that has a small bottom channel measuring 1–2 feet across.

According to the MMR records search, four 5,000-gallon USTs were installed at the study area in 1941 (E.C. Jordan Co., 1986a). Two tanks, Current Product Tank (CPT)-102 and CPT-103 were associated with a fuel-pump island adjacent to Building 3591 and contained diesel fuel. Similarly, there were two USTs, CPT-100 and CPT-101, associated with a fuel-pump island at Building 3594, and were reported to contain motor vehicle gasoline. According to available leak test records from the ARNG, CPT-100 and CPT-101 failed a hydrostatic leak test in May 1985. Each UST was reportedly emptied in June 1985 and later removed.

During the SI, three leaching wells were identified; one was sampled for chemical analysis (Leaching Well No. 1). The two other leaching wells (Leaching Well Nos. 4 and 5) were found to be destroyed and/or backfilled and could not be sampled. During the DSRP, two additional leaching wells located north of Building 3594 and former Building 3591 were identified (Leaching Well Nos. 4 and 5). Four vehicle maintenance pits were also identified. These nine drainage structures and approximately 430 cy of surrounding soil were removed as part of the DSRP in 1996 and treated in an on-site asphalt-batching facility.

Three motor vehicle maintenance buildings, Buildings 3592, 3593, and 3595, were also part of the Study Area FS-18 motor pool. Demolition of the motor pool buildings occurred in late 1990. In 1990, the study area was paved and partially fenced north of the former motor-pool buildings. The fence has been since completed, and ARNG vehicles are stored in this area.

An area of demolition debris disposal on the western side of the study area also was evaluated as part of the SI. It appears that construction-debris fill was used to partially fill a topographical depression west of Building 3591. Pieces of rebar, concrete, brick, and metal strapping were observed in the fill.

The diesel-fuel system located at Building 3591 was active during the SI field program. There are no failing leak test records for CPT-102 or CPT-103. According to MMR personnel, CPT-102 and CPT-103 were removed in August 1994.

Based on the past uses of Study Area FS-18, fuels and lesser amounts of solvents may have been spilled and released during vehicle maintenance activities. A summary of the nature and distribution of contaminants detected at Study Area FS-18 follows and focuses on site soil.

Based on results of chemical analysis, sediment in the depression west of the study area has been affected by the use of leaded fuel-related products. Concentrations of PAHs and petroleum hydrocarbons in this depression and in the drainage course on the eastern side of South Gaffney Road indicate releases and contaminant transport from the study area. The lack of detections of high concentrations of PAHs in study area soil and sediment samples indicates that the PAHs detected in these locations may be the result of nonpoint sources (e.g., automobile exhaust transported by storm-water runoff) and the accumulation of persistent fuel-related compounds (i.e., PAHs and other nonvolatile petroleum hydrocarbons) from past and current industrial use of Study Area FS-18 and the heavily traveled roads (i.e., Connery Avenue) bordering the study area.

Groundwater quality appears not to have been affected by study area activities, other than the detection of some inorganic concentrations (i.e., sodium and cyanide) above MMR background levels. The detected inorganic analytes occurring above MMR background may be attributable, in whole or in part, to road-salt use.

PRE results indicated potential risks to human health due to concentrations of benzo(a)pyrene (BaP), arsenic, beryllium, and iron. Each inorganic detected above human health Tier I HECs was at concentrations below those documented to occur in this soil type. Therefore, the inorganic concentrations alone are not necessarily indicative of site contamination. Based on the detected concentrations of dieldrin and BaP, the presence of these compounds is likely due to normal historical use and nonpoint sources (e.g., exhaust), respectively.

The PRE also indicates potential risk to ecological receptors from several inorganics. In addition, a majority of the risk caused by the presence of these inorganics is from background concentrations documented in this soil type (Kabata-Pendias and Pendias, 1984).

The drainage course east of South Gaffney Street has been affected by petroleum compounds. Although human health and ecological HECs are not available, qualitative evaluation of petroleum-hydrocarbon concentrations indicates a potential effect on human health and ecological receptors. A removal action was recommended for this study area in the Priority 2 and 3 Study Areas SI report (ABB-ES, 1993).

Discussion of Remedial Objectives

Petroleum compounds have affected the drainage course at Study Area FS-18.

Removal action objectives were developed for Priority 2 and 3 sites and are contained in appendix F.1.

Areas of Noncompliance

There are no areas of noncompliance.

Recommendations
Implement the selected remedy for Priority 2 and 3 sites as described in appendix F.1.

Statement of the Continued Protection of Human Health and the Environment
The selected alternative will meet removal action objectives and provide protection of human health and the environment at the study areas. See appendix F.1 for details.

APPENDIX F.13

Site Name: United States Coast Guard Chemical Spill-4 Hanger 128 Area/United States Coast Guard Fuel Spill-1 Hanger 128 Fuel Spill

Site Description

Study Area CS-4 (USCG)/FS-1 (USCG) is located on Riley Street in the ANG section of MMR and includes the area around Hangar 128 (Figure 6). During the SI, the study area was observed to be nearly level with a gentle slope from north to south. Most of the study area was paved, with areas of grass to the east and west of the aircraft door on the northern side of the hangar. No stains were observed in this area during Phase 3 of the field investigation. Hangar 128 is inside the security gate at MMR, and the northern side of the hangar is in the flightline restricted area. A trench drain, approximately 170 feet long, is present on the northern side of the hangar.

Hangar 128 was first discussed in the Task 6 records search, in which it was identified as a potential source of contaminants contributing to AOC SD-4. Additional evaluation of Study Area CS-4 (USCG)/FS-1 (USCG) was conducted during the Task 7 records search (E.C. Jordan Co., 1986b). Disposal of solvents and petroleum-based oils and lubricants (POLs) onto the hangar floor and infiltration through floor joints was cited as a source of potential contaminant release. In addition, two fuel spills were documented on the northern side of the hangar.

From 1955 until 1970, Hangar 128 was used to maintain EC-121 (i.e., Super-Constellation) aircraft owned by the USAF. During this time, unknown quantities of solvents, including toluene and TCE, were flushed into the storm-drain system. Expansion and contraction of fuel-filled wing tanks in the hangar resulted in numerous spills of AVGAS on the hangar deck. This AVGAS was reportedly washed into the storm drainage system (E.C. Jordan Co., 1986b).

From 1976 to 1988, Hangar 128 was used by the USCG to maintain fixed-wing aircraft. Wastes generated at the hangar during this period included waste oils and solvents. These chemicals reportedly were spilled periodically inside and outside the hangar (E.C. Jordan Co., 1986b). Waste oils and solvents were stored in a bowser (i.e., a portable collection tank) outside the hangar. Approximately 25 percent of the wastes stored in the bowser may have spilled onto the ground (E.C. Jordan Co., 1986b).

In 1978, two major spills occurred at the hangar. An AVGAS spill of approximately 1,000 gallons occurred on the tarmac on the northern side of the hangar and was reportedly washed into the storm-drain system. A second AVGAS spill, between 200 and 300 gallons occurring on the southern side of the hangar, was washed off the pavement onto surrounding soil.

As part of the Task 7 records search, Study Area CS-4 (USCG)/FS-1 (USCG) was ranked using the HARM and received an overall score of 54.0. A limited Phase II SI was recommended (E.C. Jordan Co., 1986b).

During Phase 1 of the DSRP, an acid pit was identified on the western side of the hangar. The pit was reportedly sealed and investigated in 1995 during the Priority 2 and 3 Supplemental Investigation.

A summary of the nature and distribution of contaminants detected during the SI and supplemental sampling investigation is presented in this subsection and focuses on soils. CPCs based on analytical data for surface and subsurface soil are listed in Tables 1-6 and 1-7, respectively. Additional discussions of Study Areas CS-4 (USCG)/FS-1 (USCG) are in the Priority 2 and 3 Study Areas SI report and the Supplemental Sampling report (ABB-ES, 1993 and 1995).

The primary contaminant source at the study area appears to be AVGAS, solvents, and POL from spills in and around Hangar 128.

A PRE completed as part of the Draft Priority 2 and 3 Study Areas SI Report was updated to reflect the new maximum concentrations and compounds detected at this study area during the 1995 investigation. Based on results of the updated PRE, a soil removal to mitigate potential risks associated with exposure of humans and ecological receptors to PAHs and inorganics in soil north of Hangar 128 was deemed appropriate by the AFCEE. This study areas was added to the scope of this EE/CA to address the removal of soil on the eastern side of the taxiway leading from the Hangar 128.

Discussion of Remedial Objectives

- At Study Area CS-4 (USCG)/FS-1 (USCG), PAHs and inorganic compounds in soil may pose a risk to ecological and human receptors. Remedial objectives for Priority 2 and 3 sites are detailed in appendix F.1.

Areas of Noncompliance

There are no areas of noncompliance.

Recommendations

It is recommended that the selected remedy for Priority 2 and 3 sites be implemented as proposed. See appendix F.1 for details.

Statement of the Continued Protection of Human Health and the Environment

The selected alternative will meet removal action objectives and provide protection of human health and the environment at the Priority 2 and 3 areas. See appendix F.1 for details.